

Laser Power Transmission Employing a Dual-Use Photovoltaic Concentrator at the Receiving End, Phase II

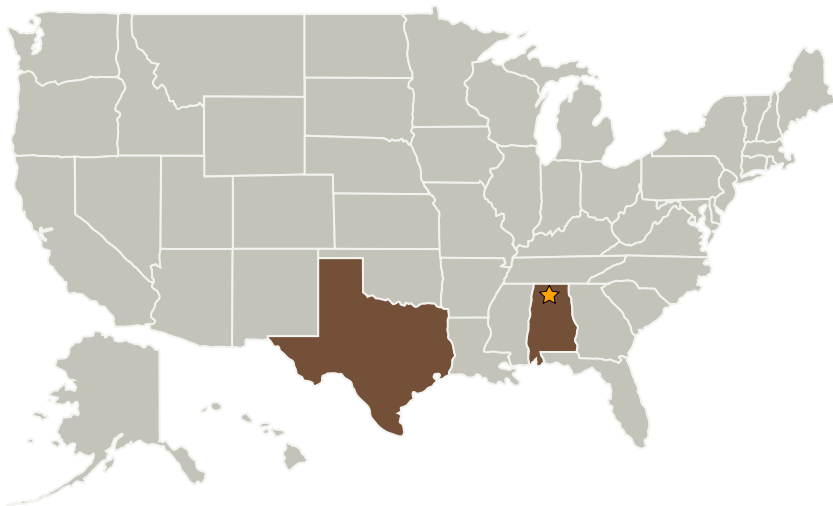
Completed Technology Project (2004 - 2006)



Project Introduction

The proposed innovation is a wireless laser power transmission system employing a dual-use photovoltaic concentrator at the receiving end. Specifically, the laser receiver/converter employs thin stretched-membrane Fresnel lenses to focus continuous or pulsed laser light onto small photovoltaic cells, thereby reducing cell cost and improving cell conversion efficiency. The dual-use approach can be implemented in several ways, to allow the same photovoltaic concentrator array to be used as a solar array and/or a laser receiver/converter array. Specifically, the photovoltaic concentrator employs multi-junction cells for high-efficiency solar radiation conversion, and single-junction cells for the high-efficiency laser radiation conversion. A prototype lens/cell unit was successfully tested in Phase I, and a more optimal array will be built and tested in Phase II. The new modular laser/solar photovoltaic concentrator will have many NASA, military, and commercial space applications. Applications include spacecraft arrays receiving laser input from other spacecraft or from Earth; lunar or planetary arrays receiving laser input from nearby spacecraft or from Earth; and Earth-based arrays receiving laser input from space solar power (SSP) spacecraft. The dual-use capability enables state-of-the-art solar operation when sunlight is available (e.g., illuminated orbit portion), and laser operation when sunlight is not available (e.g., eclipse orbit portion).

Primary U.S. Work Locations and Key Partners



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Table of Contents

Project Introduction	1
Primary U.S. Work Locations and Key Partners	1
Organizational Responsibility	1
Project Management	2
Technology Areas	2

Organizational Responsibility

Responsible Mission Directorate:

Space Technology Mission
Directorate (STMD)

Lead Center / Facility:

Marshall Space Flight Center
(MSFC)

Responsible Program:

Small Business Innovation
Research/Small Business Tech
Transfer

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Organizations Performing Work	Role	Type	Location
★ Marshall Space Flight Center (MSFC)	Lead Organization	NASA Center	Huntsville, Alabama
ENTECH, Inc.	Supporting Organization	Industry	Keller, Texas

Primary U.S. Work Locations

Alabama	Texas
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Project Management

Program Director:

Jason L Kessler

Program Manager:

Carlos Torrez

Technology Areas

Primary:

- TX03 Aerospace Power and Energy Storage
 - └ TX03.1 Power Generation and Energy Conversion
 - └ TX03.1.1 Photovoltaic